

Studying Linear Equations

**Objective:** Discover the relationship between slope, y-intercept, and the equation being used.

Today you will be working on linear graphs. Your ultimate goal will be to discover the relationship between the slope, the y-intercept, and the equation that is being graphed.

Make sure your x and y-axes both have an interval from -10 to 10. Do this by double clicking directly on the axis. Also, be sure to draw your graph and label two points on it. The y-intercept should be at least on of the points. Show all of your work when you are calculating the slope of the line.

Equation	Drawing of the graph (be sure to label two points)	Y-intercept (the point at which the line crosses the y-axis)	Slope of the line $\left( \frac{y_1 - y_2}{x_1 - x_2} \right)$
$y = x$		$(0,0)$ $y = 0$	$\frac{2-0}{2-0} = \frac{2}{2}$ slope = 1
$y = 2x + 2$		$0, 2$ $y = 2$	$\frac{4-2}{1-0} = \frac{2}{1} = 2$
$y = -2x + 3$		$0, 3$ $y = 3$	$\frac{3-1}{0-1} = \frac{2}{-1} = -2$
$y = \frac{3}{2}x + 5$		$0, 5$ $y = 5$	$\frac{8-5}{2-0} = \frac{3}{2}$

$y = 4x + -9$		$(0, -9)$ -9	4
$y = \frac{-1}{3}x + -2$		$0, -2$ -2	$-\frac{1}{3}$
$y = \frac{4}{3}x + 3$		$0, 3$ 3	$\frac{4}{3}$
$y = \frac{-1}{6}x + -1$		$0, -1$ -1	$-\frac{1}{6}$
$y = 3x$		$0, 0$ 0	3
$y = 3x + -4$		$0, -4$ -4	3

## Questions

1. What relationship do you notice between the y-intercept and the equation? Explain.

The y-intercept is always the number after the  $x$ .

2. What relationship do you notice about the slope of the line and your equation?

Equation I notice that the number coefficient of  $x$  is the slope

3. Write a verbal model describing your relationship.

The slope is the number that is being multiplied by  $x$  the y-intercept is the number that is alone.

4. Write an algebraic equation describing the relationship. Use  $m$  to represent slope, and  $b$  to represent the y-intercept.

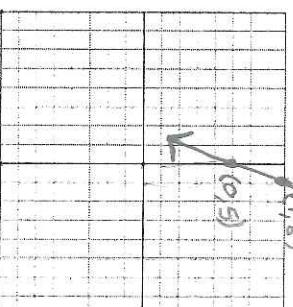
$$y = mx + b$$

5. Graph the following equation without using Grapher. Explain how you know what the y-intercept is and what the slope is.

$$y = 3x + 5$$

Slope: 3

y-intercept: 5



6. Construct your own graph. Then find the equation that fits it. Explain how you knew how to write the equation.

Equation:  $y = 2x + 1$

Slope: 2

y-intercept: 1

